more cartridge components selected from the group consisting of a wash buffer chamber, an air vent, a waste chamber, and combinations thereof. A connection between the distribution conduit and one of the plurality of fluid conduits may include a Z-transition. The cartridge may include an air vent and the one or more fluid conduits include an air vent conduit connected to the air vent, wherein the detection chamber conduit is distal from the air vent conduit. Moreover, the cartridge may include a wash buffer chamber and the one or more fluid conduits comprise a wash buffer chamber conduit connected to the wash buffer chamber, wherein the wash buffer chamber conduit is proximal to the air vent conduit and distal to the detection chamber conduit.

**[0020]** The assay cartridge described herein may also include a sample introduction port comprising a sealable closure including a sealing/capping mechanism comprising (a) a flexible hinge; (b) a latching mechanism; and (c) a retention component comprising a retention ring or tab. In one embodiment, the sealing/capping mechanism is a modular detachable insert comprising a cap for sealing the sample chamber.

**[0021]** The invention also provides a fluid flow path comprising: (a) a first resistance region; (b) a connecting region proximal to the first resistance region; and (c) a matching resistance region proximal to the connecting region and distal to the first resistance region, wherein the hydrodynamic resistance of the matching resistance region is substantially equivalent to the hydrodynamic resistance of the first resistance region and is substantially greater than the hydrodynamic resistance of the connecting region. The flow path may also include an additional region selected from the group consisting of: (d) an inlet region proximal to the first resistance region and distal to the connecting region; (e) an outlet region proximal to the matching resistance region and distal to the connecting region; and (f) combinations thereof. In one embodiment, the connecting region is provided in the same plane as the first resistance region. Alternatively, the connecting region is provided in a different plane relative to the first resistance region and the matching resistance region. The connecting region may include a Z-transition between the first resistance region and the matching resistance region. The connecting region may be positioned at an exit orifice of the first resistance region and/or the matching resistance region may be positioned at an exit orifice of the connecting region.

**[0022]** The invention further provides a fluidic network comprising the fluid flow path described herein. The fluidic network may further comprise a metering component linked to the fluid flow path and configured to meter a fluid slug through the first resistance region, the connecting region and the matching resistance region. The metering component may be configured to meter the fluid slug through an additional region of the fluid flow path selected from the group consisting of: (d) an inlet region proximal to the first resistance region and distal to the connecting region; (e) an outlet region proximal to the matching resistance region and distal to the connecting region; and (f) combinations thereof. In one embodiment, the metered volume is approximately equal to the sum of the volumes of the first resistance region and the connecting regions. The sum of the volumes of the first resistance region and the connecting region is about 75-125%, e.g., about 85-115%, 95-105%, or 100% of the metered volume. Alternatively, the sum of the volume of the first resistance region and the connecting region is about 100-125% of the metered volume, e.g., about 100-115%, or 100-105% of the metered volume. The volume of the fluid slug may be less than about 200 uL, e.g., less than about 50 uL, or less than about 10 uL. The volume of the fluid slug may be between about 20 uL and about 50 uL. Still further, the volume of the first resistance region relative to the volume of the fluid slug varies over a range of about 10-90%, e.g., about 20-80%, or 30-70%. In one embodiment, the combined volume of the first resistance region and the connection region relative to the volume of the fluid slug varies over a range of about 10-90%, e.g., about 20-80%, or 30-70%.

**[0023]** The fluid flow path described herein may include a fan region in the first resistance region. The first resistance region may be a high aspect ratio flow cell. In one specific embodiment, the first resistance region is configured as a detection chamber. The first resistance region may be about 5 mils×120 mils and the matching resistance region may be about 10 mil×80 mil. In one embodiment, the height of the first resistance region is about half the height of the matching resistance region. Still further, the inlet region comprises a throw region and the inlet region is positioned between two sensing sites, wherein the volume of the connecting region is greater than or equal to the volume of the throw region.

**[0024]** The invention also provides a method for moving fluid in a fluidic network comprising: (a) introducing a fluid slug into a hydrodynamic resistance matched fluid flow path within the fluidic network, wherein the flow path comprises the following components: (i) a first resistance region; (ii) a connecting region proximal to the first resistance region; and (iii) a matching resistance region proximal to the connecting region and distal to the first resistance region; and (b) using air pressure to move the fluid slug through the flow path. The flow path may be configured such that (i) the hydrodynamic resistance of the matching resistance region is substantially equivalent to the hydrodynamic resistance of the first resistance region and is substantially greater than the hydrodynamic resistance of the connection region; and (ii) the volume of the fluid slug is greater than the volume of the first resistance region and less than the combined volume of the first resistance region, the connecting region and the matching resistance region. The method may further comprise metering the fluid slug prior to introducing the fluid slug into the flow path (step (a)). The method may also include following steps: (a) introducing the fluid slug into the inlet region (with a throw region), the first resistance region and the connecting region; (b) moving the fluid slug under air pressure until the trailing edge of the fluid slug passes the second sensing site; (c) moving the fluid slug under air pressure in the reverse direction until the leading edge of the fluid slug passes first sensing site; (d) repeating steps (b) and (c) a plurality of times to achieve a back-and-forth mixing action. In addition, the method may also include (d) clearing the fluid slug from the first resistance region through the matching resistance region, and optionally, maintaining a constant flow rate as the fluid slug is cleared from the flow path.

**[0025]** Also provided is a cartridge reader configured to analyze an assay conducted in an assay cartridge, the cartridge reader comprising (a) an enclosure; (b) a cartridge tray for holding a cartridge during analysis in the cartridge reader; (c) a rail in the enclosure, wherein the cartridge tray is mounted on the rail the tray and can move in and out of the enclosure by moving along the rail; (d) an actuator to move the cartridge tray along the rail; (e) a mounting frame in the enclosure, the mounting frame configured to align the cartridge with one or more reader components; and (f) an align-